

3. PROCESS DESCRIPTIONS

3.1 Purpose and Scope

The process descriptions for the SSSTF are presented in this section. These descriptions are based on the BFD presented in Section 2, Figure 2-2. The engineering process diagrams and these descriptions define the basic process steps, activities, and decisions relating to implementation of the baseline project requirements for the SSSTF/ICDF, as documented in the T&FR document.

This section presents the process descriptions for the receiving, staging/storage, and treatment processes. Container storage/staging and waste weighing, tracking, and inspection are also described.

Waste will arrive at the ICDF complex from various on-site INEEL CERCLA remediation sites. These sites, the waste form, etc. are covered in EDF-1540 (see Reference 3), and are grouped into the following categories for the diagrams: (1) landfill waste (waste meeting the ICDF landfill WAC without treatment); (2) stabilization waste (nonaqueous waste requiring stabilization in the SSSTF); (3) well development/purge water (aqueous waste from well purging and development activities); and (4) special case. (Special case waste is essentially waste that will require special handling procedures. See definition section for a more detailed description of special case waste.)

Analysis of the waste streams identified in the *SSSTF Waste Inventory Design Basis*, EDF-1540 (see Reference 3), and the regulatory requirements for the wastes resulted in several reductions in the complexity of the original conceptual design documented in the *Conceptual Design Report for the Staging, Storage, Stabilization, and Treatment Facility* (see Reference 2). These changes include removal of the neutralization and chemical treatment processes, a dual auger shredder for sizing waste, the need for sampling incoming waste, remote handling equipment, and manual sorting process equipment and facilities. The conceptual design of the stabilization process was also changed as a result of waste stream evaluations. See References 3-10 for these analyses and decisions.

3.2 Receiving

The waste receiving process shown as receipt and verification on the BFD includes the steps taken from the arrival of the waste at the SSSTF to disposal at the ICDF landfill or evaporation pond or to the staging of the waste prior to its transfer for treatment. NOTE: The SSA located within INTEC will act as the Temporary Storage Unit (per 40 CFR 264.553) for the storage of CERCLA wastes until the SSSTF/ICDF is opened. After that time, the SSA will be administered as a part of the SSSTF. This EDF assumes that the SSSTF/ICDF will open in 2003.

3.2.1 Waste Receipt

A Waste Profile Sheet (WPS) for each waste container will have been approved by SSSTF/ICDF administrative personnel before arrival of the waste at the SSSTF gate. All required fingerprinting of the waste will have been performed prior to shipment by the INEEL site generating the waste. Waste sent to the SSSTF/ICDF complex must meet the appropriate components of the SSSTF/ICDF WAC (which includes the ICDF landfill WAC, the SSSTF treatment WAC, and the ICDF evaporation pond WAC) to be accepted for processing in the SSSTF/ICDF complex. Since the INEEL is one CERCLA site, and the liability for waste placement resides strictly within the DOE purview, additional fingerprinting of the waste at the SSSTF will not be performed. Validation of the shipment by SSSTF personnel will be performed at a holding pad outside the SSSTF gate. This validation will verify that the shipment is in accordance with the WPS and is the waste specified on the profile.

Validation of the waste shipment will include an initial inspection of the waste to determine whether it appears to match the identity of the waste specified on the WPS. This inspection will verify information such as an adequate WPS, actual number and type of containers matching the WPS, and intact containers. All waste loads will be verified (load inspection and quality assurance [QA] verification of load profile) to comply with QA guidelines and regulations, and pertinent information will be entered into the ICDF waste tracking system.

3.2.1.1 Landfill Waste. Waste identified on the WPS for direct disposal at the ICDF landfill is expected to arrive primarily in 13 yd³ roll-off containers or in dump trucks. Containers that require sizing to prevent significant subsidence in the ICDF landfill, such as wooden boxes and drums, are only to be used on a special case-by-case basis. The need to limit container types acceptable to the SSSTF is driven by the high costs to the SSSTF of incorporating sizing equipment such as a shredder into the equipment/facility design and into operations to allow for waste containers that are not expected to be necessary. In order to achieve facility processing rates, containers that hold less than 13 yd³ are also to be avoided, especially in the years 2005-2008, when incoming waste rates are highest. Discussions and written agreements with the waste generators are needed to ensure the waste is packaged and delivered in containers appropriate to the SSSTF. None of the landfill waste in the waste inventory is currently packaged.

After verification of the WPS, the waste transport vehicle will drive through the SSSTF gate and to the scales to be weighed.

3.2.1.2 Stabilization Waste. Waste requiring stabilization treatment is also expected to arrive primarily in 13 yd³ roll-off containers or in dump trucks. Containers that require sizing, such as wooden boxes, are only to be used on a special case-by-case basis. With the exception of approximately 825 boxes from CPP-92, -98 and -99 that are already packaged and stored, none of the waste in the inventory is currently packaged.

After verification of the WPS at the holding pad outside the SSSTF gate, the waste transport vehicle will drive through the gate and to the scales to be weighed.

3.2.1.3 Well Development/Purge Water. Water from well development and purge activities will arrive at the SSSTF in tanker trucks. At the holding pad outside the gate, the WPS will be checked and paperwork filled out, then the vehicle sent to the ICDF evaporation pond through the SSSTF. The vehicles will be processed through the SSSTF gate and weigh station.

3.2.1.4 Special Case Waste. Special case waste will be received under the same basic process as other non-aqueous wastes, but with special procedures. Special case wastes are wastes that may be accepted at the SSSTF that are not compatible with predetermined operating processes such as non-contact handled waste and TSCA wastes with ≥ 500 ppm PCBs. Wastes with no identified disposal or treatment options due to transuranic [TRU] material content between 10 and 100 nCi/g are also considered special case waste.

Non-contact handled waste consists of radiologically contaminated soils and debris having contact radiation levels greater than 200 mR/hr on the exterior of the packaging container. A radiological engineer reviewed the waste streams in the EDF-1540 and identified no stabilization waste streams and only three landfill waste streams from the inventory that he considered potentially non-contact handled--CPP-36/91, CPP-19, and the tank farm IDW. Since these waste streams make up only a very small amount of the total SSSTF non-aqueous waste inventory volume, (approximately 1%), these waste streams are classified as special case. Special equipment and facilities to handle these wastes in the SSSTF, such as remote handling equipment and extra shielding are not included in the SSSTF design.

Although these waste streams require less handling than the stabilization waste streams, the potential for significant radiological exposure to personnel requires that methods of packaging, handling, storing, and transporting these wastes be addressed. This analysis is being performed as part of the 90% design effort.

Visual screening and monitoring by radiological control and/or industrial health personnel will determine whether the waste can be handled by normal procedures or whether the waste will require special handling procedures.

The waste inventory identifies no wastes with PCB concentrations high enough to require treatment. Accordingly, the SSSTF is not designed to address specific treatment for PCB wastes, and if encountered, TSCA wastes with PCB concentrations ≥ 500 ppm will be handled as special case waste. Low levels of PCBs are shown in the waste inventory for both landfill waste and stabilization wastes; these streams are not special case wastes.

No waste with TRU material concentration between 10 and 100 nCi/g are identified in the waste inventory, with the possible exception of some of the tank farm IDW, which is not yet characterized. Since the volume of this type of waste will be a maximum of 80 yd³, again this waste would be handled under special procedures. Since the SSA contains storage space for the tank farm IDW, it will be delivered to the SSA for storage, and will not need to be brought to the SSSTF unless the waste meets the WAC for treatment or landfill disposal.

3.2.2 Weighing and Tracking

All waste entering or exiting the facility will be weighed and included in the waste tracking system at the weigh scale station. The weighing process shall have the capability to determine the weight of the waste vehicle being processed to comply with landfill standards for cell location and cell content. Additional tracking of the waste will be required during various treatment and staging/storage activities. Special case wastes will require additional tracking.

The weighing scale will be designed to accommodate a single truck containing either bulk waste or loaded with 13 yd³, waste-laden, roll-off containers. Once the shipments have been weighed, pertinent information will be entered into an ICDF tracking system.

3.3 Waste Storage and Staging

After weighing the incoming waste shipments, the transport vehicles deliver the loads directly to the ICDF landfill or to the stabilization treatment building. Storage pads are provided for a small number of containers of each waste type to allow for delays in processing. For further information on waste storage, see *SSSTF Waste Storage and Staging*, EDF-1545 (see Reference 4).

3.3.1 Landfill Waste

After being weighed, transport vehicles with landfill waste are to be driven directly through the SSSTF to the ICDF landfill. However, to account for possible delays at the landfill, a pad for 10 roll-off containers is provided.

3.3.2 Stabilization Waste

After being weighed, transport vehicles with stabilization waste are taken to the stabilization facility. An area for staging 4 days of roll-off containers is provided for expected variations in processing rates.

An additional area for containers of treated waste will be provided outside the treatment facility. This area will provide staging for 6 days of roll-off containers while the results of tests on stabilized waste samples are obtained.

3.3.3 Well Development/Purge Water

No storage is provided in the SSSTF design for well development/purge water. Regulatory requirements evaluation of the water and the evaporation pond determined that all well development/purge water will be accepted at the pond without treatment or need for sampling. Storage at the SSA, which will be administered as part of the SSSTF, will be available if needed.

3.3.4 Special Case Waste

Special case waste will be segregated from waste requiring treatment and/or disposal and will be staged in locations specific to their waste type. Since the SSA contains storage space for special case waste with TRU material concentrations from 10-100 nCi/g, no additional storage for this possible waste stream is included in the SSSTF design. With no treatment, storage, or disposal (TSD) identified for this waste, it is assumed to require long-term storage at the SSA.

Special case waste may require repackaging in accordance with the requirements of the specific receiving TSD facility or other facility located outside the SSSTF/ICDF complex at which the waste will be accepted. The SSSTF WAC will require the waste generators to package special case waste properly for the specified TSD facility, where possible. If the waste generators are not required to package for the TSD facility, an area would need to be provided to perform packaging and loading of waste for off-site disposal.

3.3.5 SSSTF Decontamination Station Water Sump

A decontamination station will be required for decontaminating waste transport vehicles and containers after waste disposal. Water from this pad will be filtered, drained to a sump, then pumped to the ICDF evaporation pond. Storage and sampling of the decontamination water is not required because the evaporation pond is a Corrective Action Management Unit (CAMU) and the decontamination water was produced on-site. Solids from the decontamination pad will be sent either to the ICDF landfill or to the solidification process. The need for storage of the solids will be based on the filtration method and will be determined as facility design progresses.

3.4 Treatment Process

The intention of the SSSTF is to treat CERCLA remediation wastes (i.e., soils and debris), as necessary, for disposal in the ICDF landfill. Furthermore, hazardous or mixed waste originating outside the WAG 3 AOC will be treated at the SSSTF to comply with RCRA LDRs prior to disposal.

Stabilization is planned for treating RCRA metals, and treatment for organic contaminants is not needed. Any equipment used to handle PCB-contaminated soils will require decontamination to satisfy the substantive PCB equipment decontamination requirements.

Loads of stabilization waste are taken directly from weighing into the stabilization building for sizing, if necessary, and treatment. Staging areas for 4 days worth of pre-treatment waste and 6 days worth of post-treatment waste at the peak processing times are provided.

3.4.1 Sizing

Analysis of the waste inventory shows that the number of waste containers that requires sizing is minimal. Only wastes that require treatment and are already packaged in disposable containers are considered to require sizing. Wastes that meet these criteria include 648 wooden boxes from CPP-92, 118 wooden boxes from CPP-98, and 59 wooden boxes from CPP-99. Since these wastes make up less than 1/2% of the overall non-aqueous waste inventory and approximately 5% of the stabilization waste, the high cost of a shredder/pulverizer is considered to be unnecessary. See *SSSTF Stabilization and Encapsulation Process Definition*, EDF-1542 (see Reference 8). Instead, a more cost-effective and versatile method of waste sizing and waste stabilization was chosen for the design (see Reference 8 for further detail on this design and its selection).

3.4.2 Stabilization

The following description of the stabilization process is based on the SSSTF CDR and EDF-1542, *Stabilization and Encapsulation Process Definition* (see Reference 8).

The stabilization treatment will contain the necessary equipment to formulate and mix waste into a stabilized form. The plant will be equipped with a decontamination wash system so that residual waste or contamination may be removed to meet operational threshold limits.

A truck with hoisting capabilities will dump the waste from the roll-off containers into the batch stabilization unit. Water and the stabilization reagents, which may include a combination of Portland cement, blast furnace slag, fly ash, clay, and sand will be fed into the unit, mixed, then loaded into containers through a load out port. The stabilized waste will then be taken to the ICDF landfill for disposal. Waste batches that are sampled will wait on a holding pad until sample results have confirmed acceptability of the stabilized waste. If PCBs are encountered, equipment used to handle the PCB-contaminated soils will be decontaminated to satisfy decontamination requirements.

For processing rate calculations, it is assumed that the average waste loading will be 75%. Process calculations also used two 13 yd³ roll-off containers per batch on both the input (untreated waste) side and the output (treated waste) side.

Following successful waste treatment, the waste will again undergo weighing and verification of ICDF WAC before disposal in the ICDF landfill. The waste containers are taken to the ICDF landfill for disposal. If the waste fails analysis, the batch or container will be recycled through the plant and re-stabilized.

For waste stabilized at the SSSTF, the post-treatment verification requirements consist of the sampling and analysis requirements for the treated waste to ensure that the treatment was effective and that it meets the waste acceptance criteria of the ICDF. A Waste Sampling and Analysis Plan will be developed for the treatment facility that will be based on the DQO process, and will describe the approach to sample collection procedures and frequency to verify that the treated waste meets LDRs.

3.4.3 Organic Treatment

As the waste inventory for the SSSTF was further refined and the regulatory requirements evaluated, it became apparent that there was no waste in the inventory that required treatment for organics. This portion of the treatment processes of the SSSTF has been removed from the design.

3.5 Waste Weighing, Tracking, and Inspection

Following the treatment process and before exiting the SSSTF, waste will be weighed and inspected, and pertinent information will be entered into the ICDF waste tracking system. The tracking system will maintain location information regarding waste placement by type.

3.6 Disposal

Although disposal operations are outside the scope of the SSSTF, it assumed that the following is an accurate description of these processes. This description was used in process rate calculations and manloading estimates.

3.6.1 Landfill and Stabilization Wastes

Landfill wastes and treated stabilization wastes are delivered to the ICDF landfill for disposal. Although landfill operations are out of the scope of the SSSTF project, an assumption of the process is needed to determine processing rates and facility design. It is assumed that one operator will dump the loads while another operator sprays water to control dust, and a radiological control technician monitors the operation. The roll-off container or dump truck will then be sprayed out with water before it is returned to the SSSTF survey and decontamination stations.

Each truck will be surveyed for external radiological contamination and any truck that requires decontamination will be taken to the decontamination station, cleaned, and resurveyed.

Empty waste transfer vehicles released by radiological control personnel will then return to the scales to be weighed, and leave the SSSTF through the gate.

3.6.2 Well Development/Purge Water

Since disposal of well development/purge water in the ICDF evaporation pond does not affect the SSSTF processing rates or facility design, a description of the process is not part of this document.

3.6.3 Special Case Waste

As with other special case waste operations, disposal operations for special case waste will be determined when the nature of the waste material and forms is understood. Special case wastes with TRU material concentrations greater than 10 nCi/g will not be disposed of in the ICDF landfill.

3.7 Container Storage/Staging

After decontamination, the empty containers will be delivered to a curbed staging pad for empty roll-off containers until they are required for further use. Empty drums and/or SWBs will be sized or reused, as appropriate. Waste minimization applications will be implemented during this process. If waste containers held wastes that contained only RCRA contaminants (not including acute wastes), then the RCRA empty container rule can be applied and the drums reused or disposed of at the Central Facilities Area (CFA) landfill for solid wastes.

4. REFERENCES

1. U.S. Department of Energy Idaho Operations Office, *Final Record of Decision, Idaho Nuclear Technology and Engineering Center*, Operable Unit 3-13, Idaho National Engineering and Environmental Laboratory, DOE/ID-10660, Rev. 0, October 1999.
2. U.S. Department of Energy Idaho Operations Office, *Conceptual Design Report for the Staging, Storage, Stabilization, and Treatment Facility*, DOE/ID-10769, Rev. 1, July 2000.
3. Bechtel BWXT Idaho, LLC, *SSSTF Waste Inventory Design Basis*, EDF-1540, Idaho National Engineering and Environmental Laboratory, October 2000.
4. Bechtel BWXT Idaho, LLC, *Waste Storage and Staging*, EDF-1545, Idaho National Engineering and Environmental Laboratory, October 2000.
5. Bechtel BWXT Idaho, LLC, *SSSTF Waste Transport Study*, EDF-1543, Idaho National Engineering and Environmental Laboratory, October 2000.
6. Bechtel BWXT Idaho, LLC, *Waste Verification and Statistical Approach*, EDF-1544, Idaho National Engineering and Environmental Laboratory, October 2000.
7. Bechtel BWXT Idaho, LLC, *Organic Treatment Process Selection*, EDF-1541, Idaho National Engineering and Environmental Laboratory, October 2000. ~~DELETED~~
8. Bechtel BWXT Idaho, LLC, *Stabilization and Encapsulation Process Definition*, EDF-1542, Idaho National Engineering and Environmental Laboratory, October 2000.
9. Bechtel BWXT Idaho, LLC, *Management and Treatment of Non-contact Handled Waste*, EDF-1552, Idaho National Engineering and Environmental Laboratory, October 2000.
10. Bechtel BWXT Idaho, LLC, *Waste Disposal Verification and Statistical Analysis*, EDF-1544, Idaho National Engineering and Environmental Laboratory, October 2000. ~~DUPLICATE~~